

REMARKS

Claims 1, 10-22, 31, 40, 56-57, 61-62, 64-66 and 68-69 were rejected under 35 USC 112, first paragraph, allegedly for lack of written description. This rejection is respectfully traversed.

Claims 1 and 22 now recites “the porous membrane is configured to produce a change in both an optical characteristic and an electrical characteristic” thereby tracking the language in paragraph [0039] that “the porous membrane may be manufactured to produce a changed optical and/or electrical characteristic”

Claims 68-69 no longer recite that the membrane is uncoated. This amendment has been made to expedite prosecution, but not because the specification fails to disclose this feature. A porous membrane made according to the description in paragraph [0047] of the specification would inherently be uncoated unless specifically coated. Claims 68-69 recite that the porous membrane is an integral part of the substrate. This feature is fully supported by paragraph [0048] of the specification.

Claims 1, 10-22, 31-40, 56-57, 61-62, 64-66 and 68-69 were rejected under 35 USC 112, second paragraph. This rejection is respectfully traversed.

Claims 1 and 22 now recites “the porous membrane is configured to produce a change in both an optical characteristic and an electrical characteristic” thereby tracking the language in paragraph [0039] that “the porous membrane may be manufactured to produce a changed optical and/or electrical characteristic” Persons of ordinary skill in the art would clearly understand the meaning of the limitation “the porous membrane is configured to produce a change in both an optical characteristic and an electrical characteristic” in light of the specification. The claims are open to a porous membrane comprising a porous silicon membrane alone or in conjunction with an additional material such as a sensor layer or through a chemical dopant as stated in paragraph [0039] of the specification.

Claims 1, 10-15, 17-22, 31-36, 38-40, 56, 58, 61, 64-66 and 68-69 were rejected as being anticipated by Barth.

This rejection is respectfully traversed.

To read the limitation “a porous membrane separating the source fluid flow channel from the target fluid flow channel in the cross-channel area, wherein the porous membrane comprises a porous silicon membrane” in independent claims 1 and 22 on Barth, the Examiner cites member 8 in Figures 2-3 and member 408 of Figure 4E in conjunction with paragraph [0040] of Barth, which states:

The substrate 8 may comprise a variety of materials known in the art for designing substrates and nanopores. The substrate 8 may or may not be a solid material. For instance, the substrate 8 may comprise a mesh, wire, or other material that a nanopore may be constructed. Such materials may comprise silicon, silica, solid-state material such as Si_3N_4 , silicon-rich silicon nitride, silicon oxynitride, carbon based materials, plastics, metals, or other materials known in the art for etching or fabricating semiconductor or electrically conducting materials. The solid substrate 8 may comprise various shapes and sizes. However, it must be large enough and of sufficient width to be capable of forming the nanopore 3 through it.

What Barth teaches is that the substrate 8 or 408 could be made of a porous membrane through which a nanopore for threading a biopolymer may be constructed. Applicants respectfully submit that nowhere does Barth teach “a porous membrane separating the source fluid flow channel from the target fluid flow channel in the cross-channel area, wherein the porous membrane comprises a porous silicon membrane.”

Independent claims 1 and 22 now contain the limitations of claims 57 and 62, respectively. Thus, the anticipation rejection over Barth should be withdrawn.

Claims 16, 37, 57 and 62 were rejected as being obvious over Barth in view of Bohn.

This rejection is respectfully traversed.

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). See also MPEP 2143.03. Further, “Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”. *KSR Int’l Co. v. Teleflex Inc.*, No. 04-1350, slip op. at 11 (U.S. April 30, 2007)(citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). Independent claims 1 and 22 have been amended to recite, *inter alia*, “wherein the upper substrate member comprises a first cavity and the lower substrate member a second cavity, and wherein porous membrane is located in a hollow space formed by the first and second cavities.” These features are neither taught nor suggested by the applied references, and the Examiner has acknowledged that “Barth and Bohn do not teach the membrane being located in a hollow space formed by the first and second cavities or recessing in the upper and lower substrates.” See page 9, last three lines, of the Action.

The Examiner has attempted to fill these gaps by alleging that “it would have been obvious to one [of] ordinary skill in the art at the time of the invention to form a first cavity and a second cavity in the upper and lower substrate so that the membrane is located in a hollow space (recess) created by the first and second cavities in the upper and lower substrate, since the hollow cavities in the upper and lower substrates would help hold the nanoporous membrane in place for subsequent handling and prevent wrinkling or deforming the membrane.” See page 9, last line, to page 10, line 6, of the Action.

Applicants respectfully submit persons of ordinary skill in the art would not have modified Barth’s apparatus for threading a biopolymer through a nanopore such that “the upper substrate member comprises a first cavity and the lower substrate

member a second cavity, and wherein porous membrane is located in a hollow space formed by the first and second cavities.” Barth’s device is for threading a biopolymer through a nanopore in a substrate. The nanopore of Barth is of size “range from 1 nm to 300 nm. Most effective nanopores have been roughly around 2 nm.” See paragraph [0027] of Barth. In short, Barth’s device does not need a first cavity in the upper substrate and a second cavity in the lower substrate, with a porous membrane located in a hollow space formed by the first and second cavities, as all that Barth’s device needs is a nanopore in the substrate for threading a biopolymer and such a nanopore allows a biopolymer to be threaded already exists in the device of Barth. Making first and second cavities in the upper and lower substrates of Barth, creating a hollow space to be formed by the first and second cavities, and inserting a porous membrane in the hollow space simply makes no sense in the context of Barth’s device for threading a biopolymer through a nanopore.

Applicants respectfully submit that the Examiner has simply resorted to hindsight to fill the gaps in Barth and Bohn. There is simply no suggestion or teaching in either Barth or Bohn that one should make the hollow cavities in the upper and lower substrates “since the hollow cavities in the upper and lower substrates would help hold the nanoporous membrane in place for subsequent handling and prevent wrinkling or deforming the membrane.” This argument of the Examiner that “the hollow cavities in the upper and lower substrates would help hold the nanoporous membrane in place for subsequent handling and prevent wrinkling or deforming the membrane” is purely hypothetical, and not based on any teaching or suggestion in the cited references.

Claims 1, 10-22, 31-40, 56-57, 61-62 and 64-66 were rejected as being obvious over Bohn in view of Zimmermann.

This rejection is respectfully traversed.

As explained above, independent claims 1 and 22 have been amended to recite, *inter alia*, “wherein the upper substrate member comprises a first cavity and the

lower substrate member a second cavity, and wherein porous membrane is located in a hollow space formed by the first and second cavities.” These features are neither taught nor suggested by the applied references, and the Examiner has acknowledged that “Bohn does not teach the use of a nanoporous membrane 22 disposed between the upper and lower substrates 24, 26.” See page 13, first two lines of the last paragraph, of the Action.

The Examiner has attempted to fill these gaps by alleging that “Bohn does discuss the desirability of placing the nanoporous membrane between the upper and lower substrates without wrinkling and deforming the membrane and sufficiently holding the membrane in place for subsequent handling, but not so tightly as to permanently bond the membrane to the carrier (see paragraph [0042]).” See page 13, last paragraph, of the Action.

Applicants respectfully submit that the Examiner seems to have misread paragraph [0042] of Bohn, which states:

Mount a polycarbonate nanopore membrane having desired pore diameters on a carrier, such as a PDMS slab about 2 mm thick, without wrinkling or deforming and sufficiently to hold the membrane in place for subsequent handling, but not so tightly as to permanently bond the membrane to the carrier.

Nowhere does Bohn teach or suggest “the **desirability** of placing the nanoporous membrane between the upper and lower substrates (emphasis added).” In fact, the Examiner has acknowledged that ““Bohn does not teach the use of a nanoporous membrane 22 disposed between the upper and lower substrates 24, 26” and then contradicts himself by stating “Bohn does discuss the desirability of placing the nanoporous membrane between the upper and lower substrates”

The Examiner has also acknowledged that “Bohn do[es] not teach the membrane being located in a hollow space formed by the first and second cavities or recessing in the upper and lower substrates.” See page 14, lines 1-2, of the Action.

The Examiner has attempted to fill this gaps by alleging that “it would have been obvious to one [of] ordinary skill in the art at the time of the invention to form a first cavity and a second cavity in the upper and lower substrate so that the membrane is located in a hallow space (recess) created by the first and second cavities in the upper and lower substrate, since the hollow cavities in the upper and lower substrates would help hold the nanoporous membrane in place for subsequent handling and prevent wrinkling or deforming the membrane.” See page 14, lines 2-8, of the Action.

Applicants respectfully submit that persons of ordinary skill in the art would not have modified Bohn’s apparatus such that “the upper substrate member comprises a first cavity and the lower substrate member a second cavity, and wherein porous membrane is located in a hollow space formed by the first and second cavities.” In Bohn’s device the polycarbonate nanopore membrane shown in Figures 2 and 3 of Bohn is placed between the upper substrate 26 and the lower substrate 24. As the faces of the upper substrate 26 and the lower substrate 24 contacting the polycarbonate nanopore membrane are flat, the polycarbonate nanopore membrane is held between the upper substrate 26 and the lower substrate 24 without wrinkling or deforming. In short, Bohn’s device does not need a first cavity in the upper substrate and a second cavity in the lower substrate to form a hollow space to hold the polycarbonate nanopore membrane as the existing arrangement of Bohn is ideal and most suitable for Bohn’s device.

In short, Applicants respectfully submit that the Examiner has simply resorted to hindsight to fill the gaps in Bohn. There is simply no suggestion or teaching in Bohn along the lines of the reasons alleged by the Examiner to fill the gaps in Bohn.

In the Response to Arguments, the Examiner states that Bohn teaches that the coating 62 may be made of gold, “which would cause a potential change in an optical and/or electrical characteristic of the porous membrane 20 (see paragraph [0028]).” See page 15, lines 12-13, of the Action. Applicants agree that gold would cause a change in an electrical characteristics and maybe used for photovoltaic applications. However, the gold coating of Bohn is not configured to cause a change in the optical characteristic of the porous membrane 20 of Bohn. The Examiner uses the phrase “and/or” in the sentence on page 15, lines 12-13, failing to recognize that claims 1 and 22 clearly recite “wherein the porous membrane is configured to produce a change in **both** an optical characteristic and an electrical characteristic of the porous membrane.” Emphasis added. If the Examiner still insists that the gold coating of Bohn is configured to cause a change in the optical characteristic of the porous membrane 20 of Bohn, then the Examiner is requested to provide a logical reasoning to support the assertion that the gold coating of Bohn is not configured to cause a change in the optical characteristic of the porous membrane 20 of Bohn.

In view of the above amendment, applicant believes the pending application is in condition for allowance. The Director is authorized to charge any fees necessary and/or credit any overpayments to Deposit Account No. 03-3975, referencing Docket No. 043395-0378243.

Respectfully submitted,

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